

## PROBLEM SET 12: INTEGRAL TEST

Note: Most of the problems were taken from the textbook [1].

**Problem 1.** *Decide whether each series is convergent or divergent.*

a)  $\sum_{n=1}^{\infty} \frac{1}{(3n-1)^4};$

b)  $\sum_{n=1}^{\infty} \frac{\sqrt{n+4}}{n^2};$

c)  $\sum_{n=2}^{\infty} \frac{\ln n}{n^2};$

d)  $\sum_{n=1}^{\infty} \frac{n}{n^4+1}.$

**Problem 2.** *Explain why the Integral Test cannot be used to determine whether the following series is convergent.*

a)  $\sum_{n=1}^{\infty} \frac{\cos \pi n}{\sqrt{n}};$

b)  $\sum_{n=1}^{\infty} \frac{\cos^2 n}{1+n^2}.$

**Problem 3.** *Find the values of  $p$  for which the following series is convergent.*

a)  $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^p};$

b)  $\sum_{n=1}^{\infty} \frac{\ln n}{n^p};$

c)  $\sum_{n=1}^{\infty} n(1+n^2)^p.$

## REFERENCES

- [1] J. Stewart: *Single Variable Calculus* 8th Edition, Cengage Learning, Boston 2015.